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the whole survey, and is accompanied by three maps, which have been prepared, with the permission of the Hydrographer, Captain Richards, R.N., F.R.S., under the careful superintendence of the Assistant Hydrographer, Captain Frederick John Evans, R.N., F.R.S., one map being allotted to each of the three magnetic elements, viz. the Declination, Inclination, and Intensity of the Magnetic Force. In these maps the Isogonic, Isoclinal, and Isodynamic lines have been drawn, by the author of the paper, conformably with the observations around the circumference of the globe between the parallel of  $30^{\circ}$  S. and the South Pole. The paper also contains Tables, prepared with a view to the revision of the calculations of Gauss's 'Allgemeine Theorie des Erdmagnetismus.' They give the values of each of the three magnetic elements at the intersections of every fifth degree of latitude between  $40^{\circ}$  of south latitude and the South Pole, and every tenth degree of longitude between 0 and  $360^{\circ}$ .

"On the Spectrum of Comet II., 1868." By WILLIAM HUGGINS, F.R.S. Received July 2, 1868.

(Abstract.)

The author describes the appearance of the comet in the telescope on June 22 to consist of a nearly circular coma, which became rather suddenly brighter towards the centre, where there was a nearly round spot of light. A tail was traced for nearly a degree.

He found the light of the comet, when examined with a spectroscope, furnished with two prisms of  $60^{\circ}$ , to be resolved into three broad bright bands.

The brightest band commences at about *b*, and extends nearly to F. Another band begins at a distance beyond F, rather greater than half the interval between *b* and F. The third band occurs about midway between D and E. In the two more refrangible of these bands the light was brightest at the less refrangible end, and gradually diminished towards the other limit of the bands. The least refrangible of the three bands did not exhibit a similar gradation of brightness.

These bands could not be resolved into lines, nor was any light seen beyond the bands towards the violet and the red.

The measures of these bands are given, and a diagram of their appearance.

The author found this cometic spectrum to agree exactly with a form of the spectrum of carbon which he had observed and measured in 1864. When an induction spark, with Leyden jars intercalated, is taken in a current of olefiant gas, the highly heated vapour of carbon exhibits a spectrum which is somewhat modified from that which may be regarded as typical of carbon. The light is of the same refrangibilities, but the separate strong lines are not to be distinguished. The shading, composed of

numerous fine lines, which accompanies the lines appears as an unresolved nebulous light.

On June 23 the spectrum of the comet was compared directly in the spectroscope with the spectrum of the induction spark taken in a current of olefiant gas.

The three bands of the comet appeared to coincide with the corresponding bands of the spectrum of carbon. In addition to an apparent identity of position, the bands in the two spectra were very similar in their general characters and in their relative brightness.

These observations were confirmed on June 25.

The remarkably close resemblance of the spectrum of the comet with that of the spectrum of carbon, necessarily suggests the identity of the substances by which in both cases the light was emitted.

The great fixity of carbon seems, indeed, to raise some difficulty in the way of accepting the apparently obvious inference from these prismatic observations. Some comets have approached sufficiently near the sun to acquire a temperature high enough to convert even carbon into vapour.

In the case of other comets, the author suggests that the difficulty is one of degree only, for the conditions are not known under which even a gas permanent at the temperature of the earth could maintain sufficient heat to emit light.

The author states that some phosphorescent substances give spectra which are discontinuous, but he gives reasons which would scarcely permit us to consider cometary light to be of a phosphorescent character.

The spectrum shows that the colour of this comet was bluish green. Considerable difference of colour has been remarked in the parts of some comets. Sir William Herschel described the head of the comet of 1811 to be of a greenish or bluish-green colour, while the central point appeared of a ruddy tint. The same colours have been observed in other comets. If carbon be the substance of some comets, this substance, if incandescent in the solid state, or reflecting, when in a condition of minute division, the light of the sun, would afford a light which, in comparison with that emitted by the luminous vapour of carbon, would appear yellowish or approaching to red.

The author refers to the bearing of these results on certain cometary phenomena, and on the apparent identity of the orbits of the periodical meteors with those of some comets.